

A Prospective Study of Functional Outcome of Tibial Plateau Fracture Treated with Locking Compression Plate

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Abstract: Introduction: With day to day increase in road traffic accidents, there is a considerable increase in the incidence of proximal tibia fracture. Knee is major weight bearing joint of the lower limb consequently any fractures involving the proximal tibia will definitely compromise the knee function and stability. Proper anatomical reduction and soft tissue management is necessary for obtaining stable, congruent mobile joint. With the developed of LCP (locking compression plate) and mippo (minimally invasive percutaneous plate osteosynthesis) technique has revolutionized the treatment of proximal tibia fractures which help in minimizing soft tissue injuries and damage to vascular integrity fracture fragments. Aim: To restore of anatomical articular congruity, stability and management of soft tissue injuries along with concomitant injuries of ligamentous and promote knee joint early mobilization. Objective: The present study was to evaluate effectiveness of locking compression plate in the management of proximal tibia fractures. Materials and Methods: The study was conducted in dept of orthopaedics, Narayana medical college and hospital Nellore Andhra Pradesh Results: Ramussen's functional grading system is used for clinical assessment. Conclusion: in order to attain knee function, surgical management of proximal tibia fractures with locking compression plate will result in excellent anatomical reduction and rigid fixation to restore articular congruity, promote early mobilization, and reduce post traumatic osteoarthritis

Keywords: Proximal tibia fractures, locking compression plate, minimally invasive percutaneous plate osteosynthesis (MIPPO).

1. Introduction

Tibia plateau fracture is said to be fracture involving proximal tibia and extend into the knee joint. Tibia fracture results from indirect coronal forces or direct axial compressive forces (most common mechanism of injury) known to one of the commonest intra articular fractures. Lateral condyle are most common (55% - 70%). isolated medial condylar fractures are seen in 10% - 23%, while bi - condylar fractures are seen in 10% - 30% of cases. majority of tibial plateau fractures are caused by road traffic accidents; however fall, sports injury or other less violent trauma can also cause these fractures. Complex fractures of the tibia are difficult to reduce, align and stabilize and constitute significant bony and soft tissue injuries within and round the knee joint. To restore congruent articular surfaces is main stay surgical management of tibial condyles maintaining stability. This will achieve functional painless and good range of motion in knee joint

Aim

This study was conducted to observe the functional outcome of surgical management in schatzker type V, VI tibial plateau fractures with proximal locking compression plate. Patients assessed post operative complications duration of union in 2 subtypes of fractures and post operative knee function with Rasmussen criteria.

2. Materials and Methods

All the patients visiting the outpatient department and emergency department of the hospital were considered.

patients diagnosed with schatzker type V, VI tibial plateau fractures

Sample Size: 30 cases of schatzker type V and VI tibial plateau fractures were taken up for the study.

Study Period: march 2023 November 2023

Study Method: prospective study

Post Operative Follow Up: 3rd week, 6th week, 3rd month, 6th month, 9th month

Inclusion Criteria:

- 1) Patients above 18 years age either sex
- 2) Closed tibial plateau fracture
- 3) Radiological diagnosis of fractures with schatzker's classification type V & VI
- 4) Patients who has given consents
- 5) Open fractures up to gustilo Anderson class I and II

Exclusion Criteria:

- 1) Patients below 18 years
- 2) Schatzker classification I, II, III and IV fractures
- 3) Patients medically unfit for surgery
- 4) Concomitant associated fractures in the same limb and upper extremities
- 5) Patients with pathological proximal tibial fractures
- 6) Fractures with compartment syndrome or impaired circulation

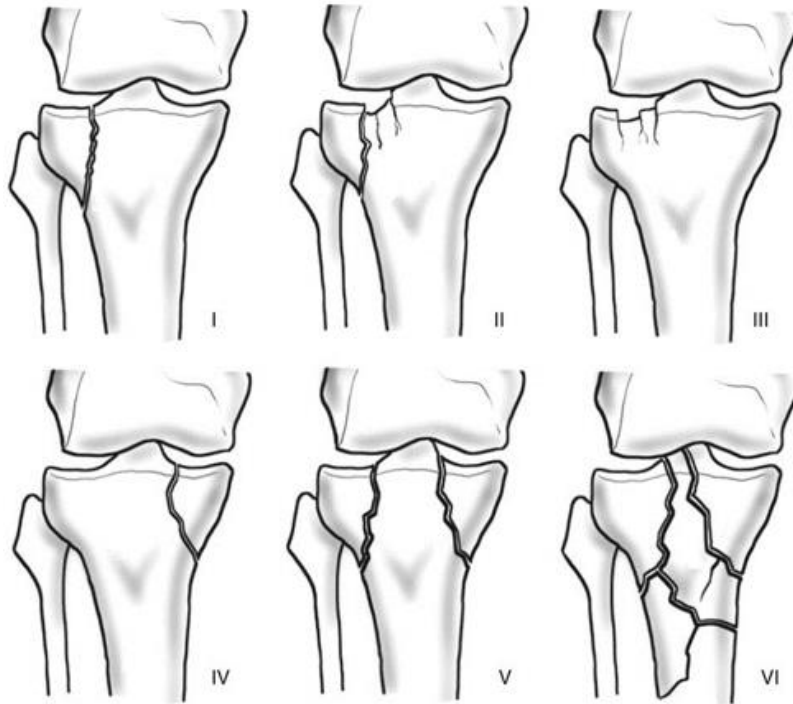
Patients subjected to surgery were followed up at regular intervals with clinical and radiological evaluation

Volume 13 Issue 4, April 2024

Fully Refereed | Open Access | Double Blind Peer Reviewed Journal

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Assessment was done based on a Performa containing all necessary information **Schatzker classification of tibial fractures**



- Type I: Lateral split fracture
- Type II: Lateral Split - depressed fracture
- Type III: Lateral Pure depression fracture
- Type IV: Medial plateau fracture
- Type V: Bicondylar fracture
- Type VI: Metaphyseal - diaphyseal disassociation

X - rays pre operative



Schatzker type V Schatzker type VI

plate was placed and 6.5mm cancellous screws applied. cortical screws were applied in the diaphysis



X - rays post operative

Surgical Procedure

The patient is anesthetized and placed in supine position with a small sand bag under the gluteal region. A tourniquet is then applied over thigh proximally and inflated. over the surgical area of limb draped and sterilised. An incision was made anterolateral or posteromedial at proximal leg and deep dissection was carried out. Full thickness flaps were raised consisting of subcutaneous fat up into the fascia. To preserve the meniscus sub meniscal arthrotomy performed to visualise the articular surface. under c - arm guidance Reduction was done k wires fixed provisionally. Locking plate or buttress



Post Operative Care

On post operative day 4, splints were removed and mobilisation was done. Suture removal was done on post operative 11. Strict non weight bearing mobilisation was done for 6 to 8 weeks depending on the fracture pattern. Later, the advised patient to partial weight bearing after confirmation fracture reunion. Full weight bearing was allowed depending on the progression and fracture healing pattern

Follow Up

- The patients followed up for minimum period of 6 months
- Follow up: 3rd week, 6th week, 3rd month, 6th month, 9th month.
- Both clinical and radiological evaluation was done at every review
- The anatomic and functional evaluation was done using the modified Rasmussen clinical and radiological criteria.

3. Results

To observe the functional outcome of surgical management in schatzker type V, VI tibial plateau fractures with proximal locking compression plate prospective study was done.

Analysis was used in terms of functional outcome of post operative knee range of movements after union, time for fracture union, early and late post operative complications.

Out of 30 patients, 27 patients (90%) had closed type fracture, while 3 patients (10%) had open fractures. Among the open fractures, 2 patients had type II open fractures, while one had type I open fracture

Fracture grade (schatzker classification)

Schatzker classification was used to grade the tibial fractures. It was observed that 16 patients (53.3%) had type V fracture and 14 patients (46.7%) had type VI fractures.

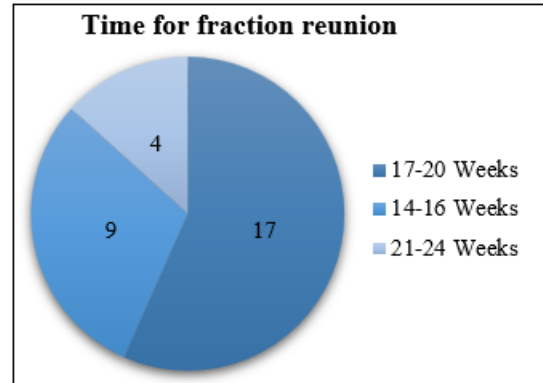
Out of 30 study subjects, 17 of them (56.7%) required dual plating, while 13 of them (43.3%) underwent single plating. cortico cancellous bone grafting was performed in 6 patients (20%) who had depressed fracture segments.

Post operative infection was seen in 2 patients (6.7%) while the rest 28 patients (93.3%) had no complications.

According to Time for Fracture Reunion:

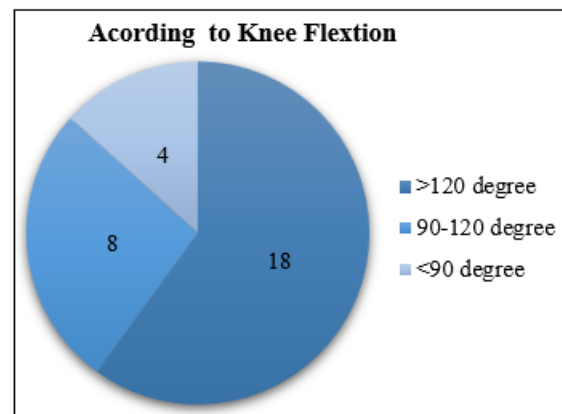
The fracture reunion in our study average time calculated to be 17 weeks

In 17 patients (56.7%) the fracture reunion occurred by 17 - 20 weeks. among others 9 fractures (30%) united in 14 - 16 weeks, while 4 fractures (13.3%) united in 21 - 24 weeks



Range of Knee Flexion Post Operatively

Post operatively, 18 patients (60%) had knee flexion of greater than 120 degrees, while 8 patients (26.67%) had flexion 90 – 120 degree. only 4 patients (13.3%) had a knee flexion of less tha 90 degrees.



The Modified Rasmussen Radiological and Clinical Assessment Criteria

It involved pain, range of motion at the knee, walking capacity, residual extension lag and stability for functional outcome

Modified Rasmussen’s scoring system 6 Parameter score

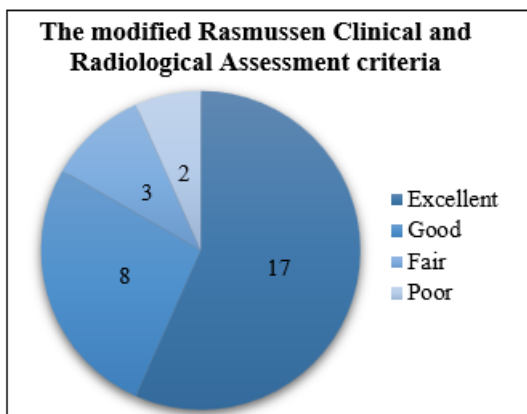
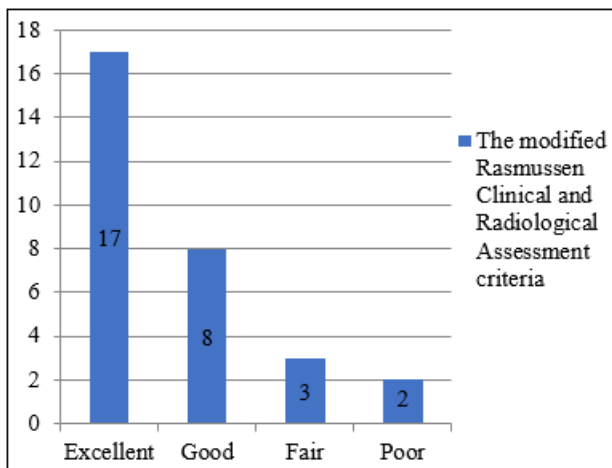
A)	PAIN	Score
1.	None	6
2.	Occasional pain	5
3.	Stabbing pain in certain position/ moderate pain	4
4.	Severe pain, constant pain around the knee after activity	2
5.	Rest pain	0
B)	WALKING CAPACITY	
1.	Normal walking capacity for age	6
2.	Walking outdoor at least 1 hour	4
3.	Walking outdoor >15 mins	2
4.	Walking indoor only	0

5.	Wheelchair / bed ridden	
C)	KNEE EXTENSION	
1.	Normal extension	6
2.	Lack of extension (0 - 10 degree) 4	
3.	Lack of extension (>10 degree) 2	
D)	TOTAL RANGE OF MOTION	
1.	At least 140 degree	6
2.	At least 120 degree	5
3.	At least 90 degree	4
4.	At least 80 degree	2
5.	At least 30 degree	1
6.	No range of movements	0
E)	STABILITY	
1.	Normal in extension and 20 degree flexion	6
2.	Abnormal instability in 20 degree flexion	5
3.	Instability in extension < 10 degree	4
4.	Instability in extension >10 degree	2
F)	POWER OF QUADRICEPS	
1.	Grade 5	2
2.	Grade 3 - 5	1
3.	Grade <3	0
	MAXIMUM SCORE	30
	EXCELLENT	27 - 30
	GOOD	24 - 26
	FAIR	20 - 23
	POOR	< 20

- MIPPO (minimally invasive percutaneous plate osteosynthesis) technique minimizes the size of the surgical incision and avoids soft tissue injury, which in turn reduces post operative complications and leads to better wound healing.
- Surgical treatment lead to proper reconstruction of articular surfaces.
- There was no statistical difference in assessing the schatzker type V and VI fracture patterns.
- Comparable results were achieved in clinical, radiological, subjective and functional outcomes based on the modified Rasmussen clinical and radiological assessment criteria.

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4. Conclusion

- Proximal tibial locking plate is better device to stabilize the fractures of tibial plateau, especially when used in conjunction with proper intra operative handling of soft tissues and active participation of the patients in the rehabilitation program.